

Before the
Federal Communications Commission
Washington, DC 20554

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|---|---|----------------------|
| In the Matter of |) | |
| |) | |
| Inquiry Concerning the Deployment of |) | GN Docket No. 14-126 |
| Advanced Telecommunications Capability) |) | |
| To All Americans in a Reasonable and |) | |
| Timely Fashion, and Possible Steps To |) | |
| Accelerate Such Deployment Pursuant |) | |
| To Section 706 of the |) | |
| Telecommunications Act of 1996, as |) | |
| Amended by the Broadband Data |) | |
| Improvement Act |) | |

Comments of Public Knowledge

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SUMMARY AND INTRODUCTION

As has been noted by too many people in too many places to count, robust access to the internet is increasingly critical to full participation in our society and economy.¹ In light of that, Public Knowledge commends the Commission for its continued focus on broadband deployment. Public Knowledge is further encouraged that the Commission has recognized that data capacity thresholds play a role in the usefulness of connectivity.

At this point, data capacity thresholds impose clear costs on consumers and the public. Unfortunately, their benefits are less clear. Before the Commission can make responsible decisions about data capacity thresholds, it must first understand and evaluate the reasons that thresholds are being imposed in the first place.

Additionally, it is once again time for the Commission to update its definition of the minimum speed that can be considered “broadband.” Public Knowledge urges the Commission to adopt a threshold of 25 Mbps down, a forward-looking benchmark that will allow Americans to experience the full promise of broadband connectivity.

¹ See, e.g. Tom Wheeler, *The Facts and Future of Broadband Competition* (Sep. 4, 2014).

ARGUMENT

I. Understanding Data Capacity Thresholds is Critical to Developing a Complete Understanding of the State of Broadband Deployment

Measuring broadband deployment is not as simple as merely determining which households can connect to the internet. It is the nature of the connection that determines if the access meaningful. That is why the Commission evaluates speed in this proceeding, and why it is considering evaluating latency and data capacity as well.

Data capacity is especially important to this analysis, and especially easy to overlook. Eye-popping advertised download speeds are of little value when capacity limits prevent consumers from using them. AT&T's U-verse offers speeds of up to 45 Mbps,² and a cap of 250 GB per month.³ At that speed, a consumer could hit her monthly limit in less than 12 hours. Wireless limits are even more constricting. Verizon's 4G wireless network promises speeds of up to 12 Mbps,⁴ but pushes users towards a 2 GB cap.⁵ At advertised speeds, a user could burn through a month's worth of data in just over 20 minutes.⁶ Even if a user is willing to spend \$750 per month (plus \$40 per month for access) for Verizon's largest data plan (100 GB per month), she could exceed her *monthly* threshold in less than 18 *hours*.

² <http://www.att.com/shop/internet/u-verse-internet.html>

³ AT&T U-verse Offer Details, <http://www.att.com/u-verse/explore/offer-details.jsp>.

⁴ Verizon LTE Information Center, <http://www.verizonwireless.com/news/LTE/Overview.html>.

⁵ Shop Single Line Cell Phone Plan from Verizon, <http://www.verizonwireless.com/wcms/consumer/shop/shop-data-plans/single-line-data-plans.html>.

⁶ Michael Weinberg, *4G + Data Caps = Magic Beans* at 7 (Public Knowledge, Aug. 2011) <http://www.publicknowledge.org/4g-data-caps-magic-beans>.

Consumers demand speed for a reason, and drastically constraining the actual use of high-speed connections with data caps undermines the utility of the network.

Focusing on speed of connection alone would overlook these restrictions, and therefore could greatly overestimate the utility of a broadband connection.

Consumers will see very little value from broadband access services with speeds that can support applications such as real-time video telephony or streaming video if capacity limits make actually using those services prohibitively expensive. In order to realistically evaluate broadband deployment, the Commission must first develop a more detailed understanding of the impact of capacity limits on consumers. As the Commission's Open Internet Advisory Committee discovered in 2013, at this point that impact is inadequately understood.⁷

II. Capacity Limits Have Costs

While capacity limits can be used by ISPs to achieve legitimate goals,⁸ it is critical to remember that such limits impose costs on consumers and society. Evaluating capacity limits requires balancing these costs against the purported benefits.

⁷ FCC Open Internet Advisory Committee, *Annual Report* (Aug. 20, 2013) ("OIAC Report").

⁸ See generally, Andrew Odlyzko, et al., *Know Your Limits: Considering the Role of Data Caps and usage Based Billing in Internet Access Service* (Public Knowledge, May 2012) <http://www.publicknowledge.org/know-your-limits-considering-role-data-caps-and-us>.

A. Capacity Limits Create a Disincentive to use Broadband

As then-Chairman Genachowski (among others) recognized back in 2012, perhaps the most obvious cost of capacity limits is that they create a disincentive to use broadband.⁹ Congress' interest in broadband deployment is not academic. Broadband should not be deployed merely in order to allow Americans to say that the entire country is connected to the internet. Deployment and access are important because of what people do once they are connected to the internet. Severely restricting the utility of deployed broadband access by imposing strict capacity limits undermines the very reason to support broadband deployment in the first place. Dreams of broadband-fueled education, healthcare, energy and the environment, civic engagement, and public safety applications¹⁰ can be dashed on the rocks of restrictive capacity limits.

No matter the limit's threshold, the very existence of a capacity limit can stand as a disincentive to use broadband.¹¹ In large part this is because average consumers do not understand how data consumption is measured, or how much data a given activity requires.¹²

⁹ See, Stacy Higginbotham and Janko Roettgers, *FCC Chairman: I'm concerned about data caps*, GigaOM, Sep. 11, 2012, <http://gigaom.com/2012/09/11/fcc-chairman-im-concerned-about-data-caps/>.

¹⁰ See, FCC, *Connecting America: The National Broadband Plan* (2010).

¹¹ See GAO, *Briefing to the Ranking Member of the Subcommittee on Communications and Technology, Committee on Energy and Commerce, House of Representatives: Internet Usage-Based Pricing* (July 29, 2014) attached as appendix ("GAO Preliminary Report").

¹² *Id.*

This confusion is understandable. Limits are often expressed in gigabytes (GB) per month. However, the data consumption of many streaming services is expressed in megabits per second (Mbps). Furthermore, those streaming rates can be both hard to find and subject to a wide degree of variation.¹³ Most streaming services use dynamic or adaptive streaming that changes in response to network conditions. As a result, even the same movie streamed over the same network to the same hardware can use different amounts of data. It provides little comfort that the two largest wireless carriers, AT&T and Verizon, disagree as to how much data streaming video requires – or that their estimate is almost half that of Netflix’s real world experience.¹⁴

Netflix’s real world performance metrics also illustrate how hard it can be to estimate data usage on a wired network, with rates varying widely from day to day on any given provider, as well as from provider to provider. As of July 2014, the best performing wired network utilized over three times more data when streaming

¹³ Even current network speeds can be hard to determine. For example, T-Mobile recently announced that it was exempting speed test apps from throttled users, making it very hard for throttled subscribers to determine actual network speeds available to them. See Mike Dano, *Confirmed: T-Mobile exempting speed-testing data from monthly data allotments*, Fierce Wireless (June 26, 2014) <http://www.fiercewireless.com/story/confirmed-t-mobile-exempting-speed-testing-data-monthly-data-allotments/2014-06-26>.

¹⁴ AT&T estimates that it requires 300 MB per hour, while Verizon puts the number at 350 MB per hour. See Clarissa Ramon, *Jump Over the Gap and Stay Under the Cap*, Public Knowledge Policy Blog, Aug. 15, 2012, <http://www.publicknowledge.org/blog/jump-over-gap-and-stay-under-cap>. In contrast, Netflix reported 4G streaming at approximately 1,400 Kbps, or approximately 630 MB per hour. See Ken Florance, *Netflix Performance on Top ISP Networks*, The Netflix Tech Blog, Jan. 27, 2011 <http://techblog.netflix.com/2011/01/netflix-performance-on-top-isp-networks.html>.

video than the worst performing network.¹⁵ Of course, as recent disputes have highlighted, the status of various peering and interconnection agreements may or may not significantly impact streaming speeds as well.

The preceding paragraphs reference the measurements gigabits per month, megabits per second, kilobits per second, and megabits per hour in a discussion limited to streaming video – only one of many activities available to a consumer with a broadband internet connection. It is simply not realistic to expect consumers to understand each of these metrics, let alone possess the capacity to easily calculate the relationships between them. How many people know that 8 bits are in a byte, and can easily convert from one to another? How many consumers know that a gigabyte sometimes refers to 1,000 bytes, and sometimes to 1,024 bytes?

When faced with high penalties for exceeding capacity limits, it should come as no surprise that most consumers will err on the side of underusing their broadband connection. Recent preliminary findings by the Government Accounting Office highlight the general state of confusion surrounding data caps, noting that some participants believed that limiting relatively data-light activities such as online shopping and social media apps would help them avoid data caps.¹⁶ This type of “restrict everything” reaction when faced with data caps is entirely predictable, and undermines the virtuous cycle of the internet.

¹⁵ The highest performing network, Google Fiber, averaged speeds of 3.59 Mbps, while the lowest performing network, Verizon (not including FiOS) averaged speeds of 0.97 Mbps. *See Netflix, USA ISP Speed Index* (July 2014) <http://ispspeedindex.netflix.com/usa>.

¹⁶ *GAO Preliminary Report* at 17.

Furthermore, capacity limits can impose costs on consumers who are nowhere near exceeding them. The mere switch from unlimited to metered plans imposes new mental accounting costs on all consumers.¹⁷ In some cases, these costs are so significant that consumers prefer higher priced unlimited plans to significantly limited plans that could ultimately save them money.¹⁸ In a stark illustration of this, the GAO found that only a “small percentage” of wireless customers elected a 500 MB per month or smaller data plan, although that plan may be adequate for some users.¹⁹

B. Capacity Limits Can Undermine Competition

One of the most compelling aspects of digital data transfer is how it has collapsed formally separate categories of services. Where a generation ago voice service was distinct from video service (which were both distinct from the services provided by a newspaper or the postal service), today all of these services can be delivered over a single broadband connection. While this is a benefit to society at large, it undermines business models designed to charge consumers once for video service, a second time for voice service, and potentially a third time for general data services.

A company that controls broadband access and profits from charging consumers for video, voice, and data separately has an economic incentive to leverage that

¹⁷ See, *Know Your Limits* 41- 46.

¹⁸ See, *id.* at 45.

¹⁹ *GAO Preliminary Report* at 11.

broadband access control to protect its other revenue streams.²⁰ Merely replacing cable television with an internet-delivered high-definition video competitor would require *between 550 and 650 GB per month of data*.²¹ With one minor exception,²² this is well above the capacity thresholds set by every ISP listed in the Open Internet Advisory Committee's survey of data caps.²³ While any ISP presenting itself as offering "broadband" should offer speeds that can support high definition video streaming,²⁴ those with caps have set capacity thresholds at a level that would prevent a consumer from replacing pay television offerings with an internet-delivered competitor.

In 2012, in a violation of merger conditions that the Commission has not yet sought fit to address, Comcast vividly illustrated the ways in which data caps can be used anticompetitively by ISPs that also operate as MVPDs.²⁵ Every online video offering a Comcast consumer enjoys on her Xbox 360 counts against that consumer's data capacity threshold – except the online video offering provided by

²⁰ See, *Preserving the Open Internet*, GN Docket No. 09-191; *Broadband Industry Practices*, WC Docket No. 07-52, "Report and Order," FCC 10-201 (Dec. 23, 2010) at ¶ 11, 37-38; *Application of Comcast Corporation, General Electric Company and NBC Universal, Inc. For Consent to Assign Licenses and Transfer Control of Licenses*, MB Docket No. 10-56, "Memorandum Opinion and Order" (Jan. 20, 2011) at ¶ 3, 93. See also, Competitive Impact Statement of the United States, *et al.*, *United States v. Comcast Corp.*, (D.C. Cir. 2011) at pp. 11, 37-38, <http://www.justice.gov/atr/cases/f266100/266158.htm>.

²¹ The variability can be traced to, among other things, the method used to stream the video. Replacing cable television with HD programming streamed at a rate calculated by Comcast would require 648 GB per month. Using the rate used by Netflix, the same amount of video would require 552 GB per month. See Public Knowledge, *Petition to Enforce Merger Conditions*, MB Docket No. 10-56 (Aug. 1, 2012) ("PK Comcast Complaint").

²² MediaCom's Ultra/Ultra Plus service has a 999 GB/mo. cap.

²³ *OIAC Report* at 35-37.

²⁴ See Section V.

²⁵ See, *PK Comcast Complaint*.

Comcast. Instead, Comcast elected to exempt its own Xfinity online video service from the data cap that it imposes on some customers. This immediately gives the Comcast option a real advantage over all unaffiliated competitors – an advantage that is only possible because Comcast owns both the online video service and the network used to deliver video to consumers.

Similarly, AT&T has rolled out a “sponsored data” plan that uses data capacity limits to insert itself into its subscribers’ online activity. After imposing a low data cap on its subscribers, AT&T announced that edge providers can pay AT&T to be exempted from the cap.²⁶ This gives all edge providers a stark choice: tithe a portion of their revenue to AT&T to assure that their apps are unaffected by the cap or risk consumers racking up overage fees. That structure grants developers willing to pay AT&T – not necessarily developers with the best apps – an advantage in the marketplace.

C. Capacity Limits Can Create a Disincentive to Invest in Networks

The national priority of increased broadband deployment can be directly and negatively impacted by capacity limits. This is because ISPs are not only moving towards imposing capacity limits on consumers – they are also moving towards imposing financial penalties on consumers who exceed the limits.

²⁶ Michael Weinberg, *AT&T’s New Sponsored Data Scheme is a Tremendous Loss for All of Us*, Public Knowledge Policy Blog (Jan. 8, 2014) <https://www.publicknowledge.org/news-blog/blogs/attas-new-asponsored-dataa-scheme-tremendous>.

These limits create at least two disincentives towards continued network investment. First, as they tend to be static and slow to adjust, capacity limits can freeze broadband usage patterns. Users are reluctant to experiment with cutting-edge, advanced services if they are worried that incorporating those services into their daily lives will cause them to run afoul of their limits. The GAO found “strong negative reactions” to data caps on wireline broadband internet connections.²⁷ These strong negative reactions were grounded in concerns about “[t]he importance of the Internet in their daily lives and the potential effects of data allowances, [h]aving to worry about data usage at home, where they are used to having unlimited access, (and) [c]oncerns that ISPs would use [data caps] as a way of increasing the amount they charge for Internet service.”²⁸

Limits geared towards “normal” usage in 1999 would have frozen data usage at levels that assumed most people used the internet primarily for the “killer application” of email.²⁹ In 2005, that same assumption would have prevented many of today’s everyday internet activities – like streaming videos, interacting with graphically rich and dynamic web services, and cloud storage and computing – from ever becoming widespread. Even today, the GAO suggests that streaming video – an application that forms the backbone of a plethora of education, medical, and entertainment applications online – is often avoided when data caps confront

²⁷ GAO Preliminary Report at 16.

²⁸ *Id.*

²⁹ National Telecommunications and Information Administration, *Falling Through the Net: Defining the Digital Divide*, 40 (1999), <http://www.ntia.doc.gov/legacy/ntiahome/fttn99/contents.html>.

users.³⁰ Historically, today's cutting edge behaviors are tomorrow's everyday activities. However, capacity limits that make cutting edge behaviors prohibitively expensive break that adoption pattern, and undermine the virtuous cycle of the internet.

Second, because capacity limits allow ISPs to monetize scarcity, they create a perverse incentive to delay network improvements that might allow capacity limit increases. ISPs profit when users go over their data caps. If an ISP that imposes capacity limits on consumers invests in its own network and increases the caps that it imposes on subscribers, it is effectively spending money in order to reduce the amount of income it receives from overage charges.

III. Capacity Limits' Purpose or Benefits are Unclear

With the exception of generating fees for ISPs, it is unclear what purpose current capacity limits are designed to achieve. Monthly data capacity limits are blunt tools to address network congestion and are ineffective price signals to consumers. As a result, capacity limits impose costs on consumers with little discernable benefit.

³⁰ *GAO Preliminary Report* at 15.

A. Monthly Capacity Limits do not Address Network Congestion

By its very nature, network congestion occurs at a specific place in the network at a specific time. As both wired³¹ and wireless³² ISPs have acknowledged, this makes network congestion a poor justification for data caps.

At its simplest, this is because monthly capacity limits do not take the state of the network into account. Streaming a high definition movie at 8 pm on a Wednesday is much more likely to contribute to network congestion than remotely backing up data at 3 am on a Sunday. Unfortunately, monthly capacity limits treat both of these activities the same.

Furthermore, there is no indication that imposing a monthly capacity limit on consumers reduces usage during times of peak congestion, or shifts activities away from times of peak congestion towards times of lower network load. This should come as no surprise – a monthly data cap provides no incentive for consumers to shift their usage pattern. The only incentive they offer is to use less data overall.

Even that incentive is poorly understood by consumers. The GAO found that some data capped customers believed that limiting online shopping and social media was an effective way to significantly reduce data consumption.³³ These

³¹ John Eggerton, *NCTA's Powell: Usage-Based Pricing About Fairness, Not Capacity*, Broadcasting & Cable (Jan. 17, 2013), <http://www.broadcastingcable.com/news/washington/nctas-powell-usage-based-pricing-about-fairness-not-capacity/61022>.

³² Kevin Fitchard, *The Gigaom interview: T-Mobile's John Legere on the myth of mobile data scarcity*, GigaOm (June 19, 2014, 12:23 AM), <http://gigaom.com/2014/06/19/interview-with-t-mobile-ceo-john-legere/>.

³³ See GAO Preliminary Report at 17.

activities usually require limited amounts of data, making them collateral damage in any rush to impose data caps on customers.

B. Monthly Capacity Limits are Ineffective Price Signals

Although they are nearly useless as tools to address network congestion, one might imagine that capacity limits could serve a role in service differentiation and price discrimination. Unfortunately, since capacity limits are poorly understood by the public, they are inefficient signals to consumers who may place a higher-than-average value on connectivity.³⁴

Price signals are only effective if consumers understand them. As described above,³⁵ understanding how the data usage for different activities can relate to a monthly capacity limit can be challenging. Furthermore, the signal that a consumer has exceeded her monthly limit can be remote from the decision to engage in the data-intensive activity. It could take weeks before a consumer who decided to stream high definition video receives a bill indicating that she exceeded her monthly data capacity limit. At that point, she has no effective way to identify which activities are driving her towards the limit, let alone consider how highly she values those activities.

These shortcomings are thrown into stark relief when monthly capacity limits are compared to another price discrimination tool: data speed. In contrast to monthly capacity limits, data speeds provide users immediate feedback that the

³⁴ See *id* at 13-20.

³⁵ See section II.A.

activity they are engaged in may require paying more for a faster broadband connection. A user confronted with buffering video (a signal that almost all internet users understand as related to connection speed) can evaluate at that moment how much she values video streaming and whether it is worth paying for a faster connection to enable such activities. Under monthly limits, that same consumer must wait until the end of the month, potentially pay overage fees, try and remember what she could have done to exceed her limit, and decide if that activity was worthwhile at the time.

IV. There is No Simple Way to Determine What Constitutes a “Reasonable” Data Capacity Threshold

In order for the Commission to adopt a data capacity threshold, it must first determine if the data capacity thresholds that exist today should be recognized as legitimate. Currently available information makes that analysis impossible. The Commission’s 2013 Internet Advisory Committee report on data caps highlights that fact, repeatedly including comments such as “much information about user understanding of caps and thresholds is missing,” “may require future monitoring,” questions cannot be answered because there is no quantitative evidence,” and “little public analysis.”³⁶

In comments submitted in a related docket in 2012, Public Knowledge commended the Commission for beginning to ask questions that will elicit some of the information required to engage in an informed analysis. Two years later, those

³⁶ *OIAC Report* at 14-33.

questions have largely gone unanswered. While Public Knowledge is encouraged that the Commission is reengaging with these issues in both this docket and the Open Internet proceeding, Public Knowledge laments that the past two years have not produced additional illumination on this subject.

What is clear, and has been clear, is that the Commission cannot simply assume that ISPs are implementing data caps in a way that is beneficial to the public interest or the virtuous cycle.

It is unlikely that simple benchmarking will provide meaningful insight into the process of adopting a threshold. Many Americans have few choices for truly high-speed broadband internet access. As a result, ISPs are not regularly forced to respond to the type of market pressure that would cause them to make adjustments to their thresholds. Looking to thresholds set by local monopolist or duopolist ISPs as guidance will be of limited utility.

In order to begin to consider the role that data capacity thresholds play in the deployment of advanced telecommunications services, the Commission must begin to ask simple questions it has only begun flirting with. Why do ISPs impose thresholds? How are individual thresholds set? Once set, how are the thresholds evaluated against their purported purpose? What conditions would cause the thresholds to change? Without answers to these questions,³⁷ any threshold adopted by the Commission would be as arbitrary as those adopted by individual ISPs.

³⁷ Questions that Public Knowledge has been raising for some time. *See, e.g.* Letter from Future of Music Coalition, New America Foundation's Open Technology Initiative, and Public Knowledge to Julius Genachowski, Chairman, Federal Communications Commission (July 14, 2011), <http://www.publicknowledge.org/letter-fcc-regarding-data-caps>; Letter from

V. The Minimum Speed for Broadband Should Be 25 Mbps

The Commission speed cutoff for what constitutes “broadband” has evolved over the years, to reflect market realities, technological progress, and policy goals. In this proceeding, the Commission should adopt a forward-looking market definition that sets a minimum downstream speed for broadband of 25 Mbps. This is a speed threshold that ensures that average households have adequate capacity for online video and other applications.

The average HD video stream requires 5 Mbps of capacity, and the average American home has three television sets. A 25 Mbps threshold ensures that viewers can use watch television while still having sufficient leftover capacity for mobile devices, online backup services, and other applications. The Commission has already founds that speeds in excess of 15 Mbps are necessary for “[b]asic functions plus more than one high demand application running at the same time”³⁸—25 Mbps for three high-demand applications plus basic functions is a reasonable extrapolation of this metric.

Public Knowledge and New America Foundation’s Open Technology Initiative to Sharon Gillett, Chief, Wireline Competition Bureau, Federal Communications Commission (May 6, 2011), <http://www.publicknowledge.org/letter-to-FCC-on-ATT-Data-Caps>.

³⁸ Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, *Tenth Broadband Progress Notice of Inquiry*, FCC 14-113, rel. August 5, 2014, Table One.

The Commission has an obligation to “review and reset”³⁹ its broadband standards periodically. It has set itself a goal of “continuing to evolve the speeds and quality of service at which broadband access is commonly available to the American public,”⁴⁰ and is required by statute to continue to improve its measurement and analysis of broadband.⁴¹ Indeed, one of the Commission’s primary obligations to promote universal access to communications technology, which includes access to “advanced telecommunications and information services,”⁴² and which requires the FCC to define “an evolving level of telecommunications services . . . taking into account advances in telecommunications and information technologies and services.”⁴³

The Commission’s past practices are in line with its policy goals and statutory duties. In the Commission’s First Broadband Deployment Report, the Commission adopted a minimum broadband speed threshold of 200 kbps downstream⁴⁴—essentially, an “as long as it’s faster than dial-up” threshold. In the Sixth Report, the Commission took “the overdue step of raising the minimum speed threshold for broadband”⁴⁵ to 4 Mbps downstream. The Commission therefore has good reason to adopt a higher standard for broadband here, one that makes sure that the Commission’s analysis takes into account the broadband needs of today and the near future--and, in particular, one that recognizes that only cable and fiber provide

³⁹ Connecting America: The National Broadband Plan (2010) at 135.

⁴⁰ Measuring Broadband America, Fixed Broadband Report (2014) at 4, <http://www.fcc.gov/reports/measuring-broadband-america-2014>.

⁴¹ Broadband Data Improvement Act, S.1492 (110th Congress).

⁴² 47 U.S.C. § 254(b)(2).

⁴³ 47 U.S.C. § 254 (c)(1).

⁴⁴ *First Broadband Deployment Report*, 14 FCC Rcd at 2406, ¶ 20 (1999).

⁴⁵ *Sixth Broadband Deployment Report*, 25 FCC Rcd 9556, ¶ 4 (2010).

the residential broadband performance that users increasingly need. This standard will help “ensure that [the Commission] remain[s] forward thinking and [is] prepared to satisfy future needs as well as immediate demands.”⁴⁶

A 25 Mbps standard will itself not be permanent--the longer term, American's broadband needs will likely demand the gigabit capacity that only fiber and upgraded cable networks can provide. But for today and the next few years, a 25 Mbps threshold is sufficient to ensure adequate capacity for online video. While online video is not the only important use of broadband, a broadband metric that reflects the needs of online video is apt—and is likely to provide sufficient capacity for other services, as well, such as online education, telemedicine, cloud storage, gaming, high-definition VoIP, and other forms of real-time communication.

CONCLUSION

Public Knowledge commends the Commission for considering including data capacity limits in the definition of broadband, and urges the Commission to do so. Fast connections with low data caps can be little better than the types of slow connections that the Commission has traditionally excluded from the definition of broadband. A realistic definition of broadband must incorporate a recognition of all of the factors that make broadband valuable. That includes a speed that is adequate to fully make use of broadband connectivity, and data caps that do not interfere with such use.

⁴⁶ *Eighth Broadband Deployment Report*, 27 FCC Rcd 10342, ¶ 21 (2012).

Respectfully Submitted,

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